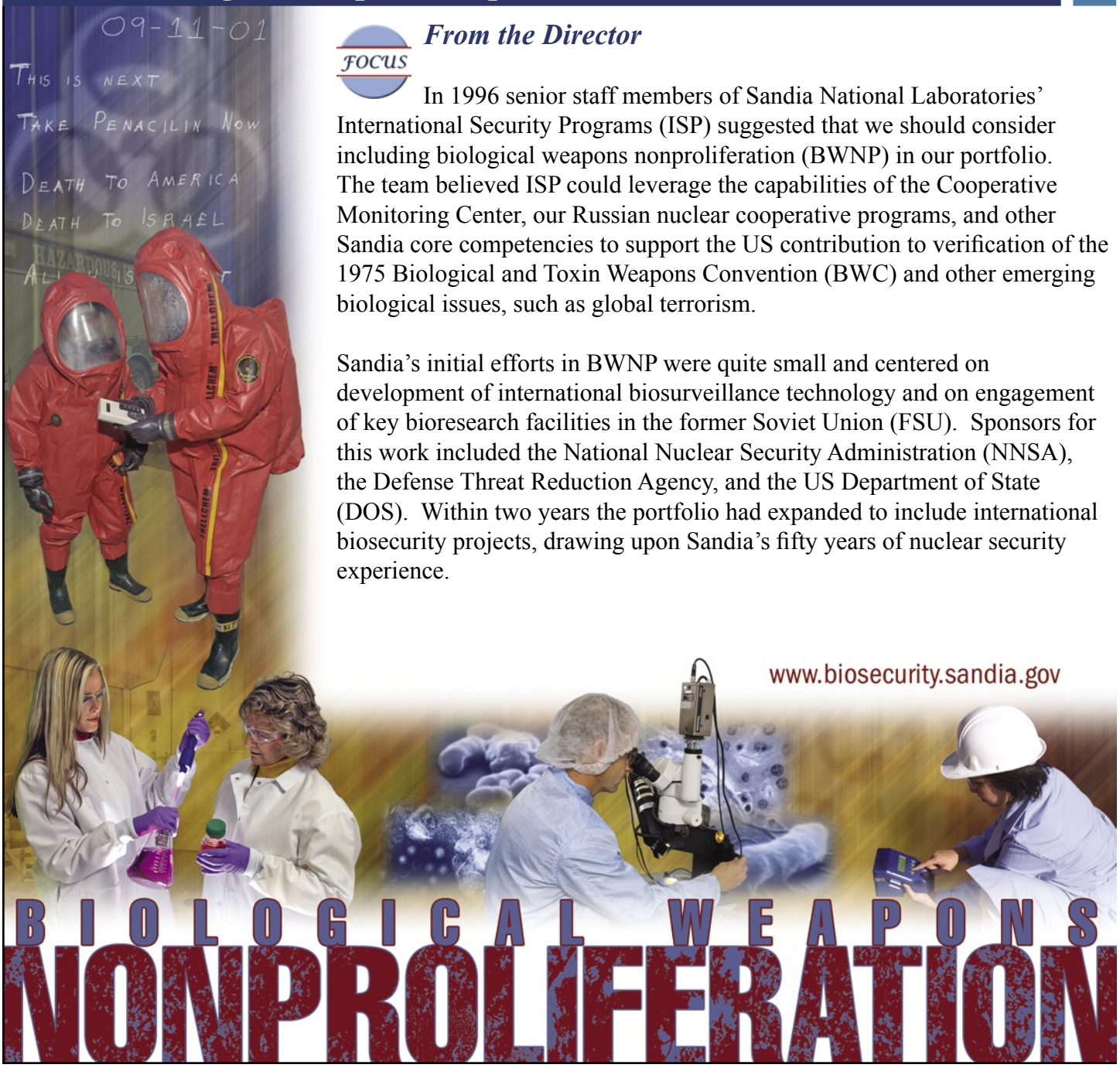
Sandia National Laboratories

International Security News

International Security Programs
Dori Ellis, Director

Focus on Biological Weapons Nonproliferation



From the Director

FOCUS

In 1996 senior staff members of Sandia National Laboratories' International Security Programs (ISP) suggested that we should consider including biological weapons nonproliferation (BWNP) in our portfolio. The team believed ISP could leverage the capabilities of the Cooperative Monitoring Center, our Russian nuclear cooperative programs, and other Sandia core competencies to support the US contribution to verification of the 1975 Biological and Toxin Weapons Convention (BWC) and other emerging biological issues, such as global terrorism.

Sandia's initial efforts in BWNP were quite small and centered on development of international biosurveillance technology and on engagement of key bioresearch facilities in the former Soviet Union (FSU). Sponsors for this work included the National Nuclear Security Administration (NNSA), the Defense Threat Reduction Agency, and the US Department of State (DOS). Within two years the portfolio had expanded to include international biosecurity projects, drawing upon Sandia's fifty years of nuclear security experience.

As with many other aspects of Sandia's work, the BWNP focus changed after September 11, 2001. Within ten days of the attacks on the World Trade Center and the Pentagon, the US Department of Agriculture (USDA) requested briefings from Sandia's BWNP team on methods for enhancing security at its laboratories. This initial contact quickly developed into a collaboration wherein Sandia has assisted USDA at key facilities.

Additional requests for domestic support followed from the US Army, the Centers for Disease Control and Prevention (CDC), and others. In time, the firsthand experiences in biosecurity gained from these collaborations led to invitations to participate at the policy level, both nationally and internationally. The articles in this issue of the *International Security News* highlight some of the numerous challenging assignments Sandia's BWNP team has received in the past three years.

The BWNP team has recently been consolidated into a single department, and its ranks have been strengthened with additional experts in security, surveillance, and microbiology. The team is conducting internal Laboratory Directed Research and Development (LDRD) projects to bolster its technology base. And, at the request of the international community, the team has committed to utilizing the domestic experiences garnered since 9/11 as a springboard to expanded international collaborations in biosecurity, biosurveillance, and bioengagement. These expanded activities are highlighted at the team's website (www.biosecurity.sandia.gov).

Eight years ago, no one could have envisioned the breadth and depth of our current BWNP program. The NNSA Office of Nonproliferation and International Security and Office of Nonproliferation Research and Engineering provided the seed funding that laid the foundation for this work long before September 11, 2001, and the anthrax attacks that occurred one month later. These and other sponsors continue to provide support and guidance today so the BWNP team can live up to Sandia's motto of *Exceptional Service in the National Interest.*

Dori

Focus on Biological Weapons Nonproliferation

General Interest

Guest Editorial

International Partnerships Advance Global Health Security

Bradford A. Kay, MS, MPH, Dr.P.H.
Coordinator, Preparedness for Accidental and Deliberate Epidemics,
World Health Organization
Lyon Office for National Epidemic Preparedness and Response,
Department of Communicable Disease Surveillance and Response

Global health is threatened by new or newly-recognized diseases, the resurgence of known epidemic threats, and the intentionally harmful use of biological agents. Whether natural, accidental, or deliberately caused, infectious diseases continue to threaten human security, in the many ways security can be defined.

Outbreaks can threaten economic and health security, as shown by the outbreak of severe acute respiratory syndrome (SARS) in 2003. This new human infection rapidly caused illness in over 8,000 people and killed nearly 800. For a thankfully brief time, SARS threatened economies of the Pacific Rim and Canada and posed a credible threat of a global pandemic. In the United Kingdom in 2001 an outbreak of foot and mouth disease (FMD) in farm animals caused economic losses of approximately US$15 billion. Likewise, the continuation of the 2004 outbreak of avian influenza in Asia has inflicted significant losses on fragile economies, with recovery costs estimated at well over US$500 million and rising.

Political and social stability can be threatened by communicable diseases. The consequences of an epidemic resulting from the deliberate use of a biological agent would be at least as damaging as naturally occurring disease and possibly more so. From a health perspective, the anthrax attacks in the United States in 2001 had modest impact (22 people were infected, 5 people died). However, the attacks resulted in enormous economic and psychological damage and raised the spectre of bioterrorism to the centre of global debates on international security. Indeed, if a highly contagious agent—such as smallpox or FMD—were maliciously used in an effective widespread manner, the international economic and security consequences alone would be without parallel.

Ironically, the development of bioscience has raised, not lowered, anxiety about global health security. Biologists and biochemists are now endowed with the unprecedented ability to manipulate the fundamental structures of living organisms. Impressive feats of biotechnology can be accomplished by individuals in virtually any country with modest facilities and limited resources. While these technologies hold great promise for agriculture, medicine, and health, the mitigation and management of the threats they pose through their deliberate misuse is a topic of great current debate.

Member States have requested the World Health Organization (WHO) to provide technical support for preparedness and response activities against risks posed by biological agents (*World Health Assembly Resolution 54.14*). WHO activities for Preparedness for Accidental and Deliberate Epidemics (ADE) seek to address preparedness issues for *non-naturally occurring* infections. These infections can result from deficiencies in laboratory biosafety and biocontainment practices, from the unintentional spread of disease in healthcare settings, as well as from the deliberate use of biological agents for harm.

The ADE strategy is to offer guidance and practical assistance to WHO Member States for safe work practices with pathogens. The goal of these activities is the containment of pathogens in laboratories and in transport, prevention of their release into the environment, prevention of their accidental spread in health care facilities, and minimization of the

opportunities for their intentional use for harm. Simply stated, the ADE strategy is to keep pathogens safe and secure where they should be and to reduce the potential for their accidental or deliberate spread.

WHO is able to address its various mandates with the assistance of a diversity of global partners. Indeed, the development of strong collaborative working agreements has been a long-standing strategy of the organization. These partnerships remain a fundamental means to establish global, regional, and national advocacy and to facilitate international cooperation. New challenges and new technologies have highlighted the need to engage nontraditional partners. The increasingly familiar juxtaposition of security communities with health communities likewise compels technical relationship between the two sectors, as illustrated by the cooperation between Sandia and WHO.

The WHO ADE and the Sandia biosecurity team (Ren Salerno and colleagues) are collaborating in the development of international guidelines for laboratory biosecurity. These guidelines, now in draft, provide information on securing pathogens and toxins in laboratories and will complement the recently completed third edition of the *WHO Laboratory Biosafety Manual*.

Additionally, Sandia and WHO scientists are collaborating on a project funded through Sandia's Laboratory Directed Research and Development programme. The goal of this effort is the development of a self-decontaminating packaging system for the shipment of infectious substances. Such a breakthrough in packaging technology would address concerns about infectious materials in transport and could facilitate the rapid international shipment of dangerous pathogens. Other issues under discussion are laboratory containment methods for significant pathogens, such as poliovirus following its eradication, SARS virus, and highly pathogenic influenza strains. Strong partnerships, such as the one between the WHO ADE and the Sandia biosecurity team, are critical to successfully advancing the cause of global health security.

Bradford A. Kay was born in the United States, grew up in New Jersey, and served in the United States Navy. Dr. Kay earned university degrees in medical microbiology and public health. His career has included work as a university research scientist and as a specialist in public health laboratories. He lives in Lyon, France, where he coordinates a global program to develop disease early warning systems for the World Health Organization. Dr. Kay has lived in Spain, Peru, Bangladesh, Egypt, Zimbabwe, and France, as well as in five states in the United States.

World Health Organization

The Biological Weapons Convention

The Biological and Toxin Weapons Convention (BWC) was the first multilateral treaty to prohibit the production, stockpiling, and acquisition of biological weapons among its Member States. The BWC opened for signature in 1972 and entered into force in 1975. By that year, over 100 nations had signed the BWC. Today, the Convention has expanded to include 151 States Parties and 16 Signatory States.

US programs in support of the BWC continue to this day and entail participation in a variety of BWC functions. The most important of these programs include the approximately pentannual review conferences, which are designed to review and improve upon the treaty's implementation. US representatives have attended or will be attending three supplementary Meetings of States Parties, to be held before the 2006 Review Conference. These meetings focus on:

- Improving national legislation and national oversight of dangerous pathogens (2003)
- Enhancing international capabilities to address alleged cases of BW use and strengthening and broadening national and international efforts for disease surveillance (2004)
- Establishing codes of conduct for scientists (2005)

Although the difficulty of identifying state-level BW proliferation has precluded the development of effective verification or enforcement mechanisms, the BWC has nonetheless had value in setting global norms regarding the building and stockpiling of biological weapons. Source: Lauren Hickok 6928, MS 1371, 505-284-8828, fax 505-284-8870, lthicko@sandia.gov

Biodefense

FOCUS

Biodefense aims to improve the ability of the United States to respond domestically to an outbreak of highly infectious disease, specifically as a result of bioterrorism, after it has occurred. The United States is currently pursuing a wide range of biodefense activities, including:

- Improving diagnostics and disease surveillance
- Developing detection technologies
- Strengthening emergency response capabilities
- Enhancing decontamination and remediation technologies
- Building public and agricultural health capacities
- Increasing the effectiveness and availability of vaccines and therapies

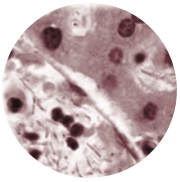
Since 2001, the United States has invested at least $10 billion in biodefense. And in fiscal year 2005, over $7 billion of funding has been requested. This funding has been spread among a wide range of tasks in numerous government agencies. Although the scope of each is impractical to list here, several are worth mentioning.

Project BioShield, formalized in the BioShield Act of 2004 (P.L. 108-276), is an initiative that spurs the development and distribution of drugs and vaccines to protect the civilian population in the event of a BW attack. BioShield provides funding to purchase improved medical countermeasures, accelerates critical research on medical countermeasures, and helps ensure that the Food and Drug Administration will make treatments available in emergency situations.

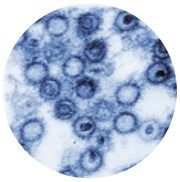
***Biodefense** continued on page 7*

Biological Weapons Nonproliferation

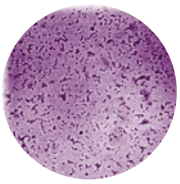
Biological weapons present a clear and present danger to national and international security. Countering this threat requires a comprehensive strategy that encompasses both international biological weapons nonproliferation (BWNP) and domestic biodefense (See "Biodefense," page 5), which respectively aim to prevent and respond to biological attacks.



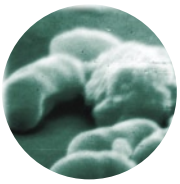
BWNP is an international strategy designed to prevent the use of biological weapons. The United States has addressed BWNP through two specific components: the Biological and Toxin Weapons Convention and a variety of programs to engage the former Soviet Union. Both of these BWNP components have been based on a traditional definition of *weapons* used by nation states. The Biological and Toxins Weapons Convention is designed to ensure that its signatories will not build or stockpile biological weapons. US BWNP programs in the FSU are implemented by the US Departments of State, Defense, and Energy; these programs focus on Russia and the other states of the former Soviet Union, which confirmed in the early 1990s that the FSU had possessed an offensive BW program. Recently, some of these activities have been expanded to Iraq and Libya.



As the anthrax attacks of 2001 demonstrated, BW use does not necessarily require a traditional weapon system, such as a warhead loaded on a missile, and is not necessarily limited to the capabilities of nation states. Anthrax spores in an envelope or an infected pig on a truck can each be deployed maliciously by a terrorist to cause outbreaks of highly infectious disease. Moreover, the agents, technologies, and expertise necessary to conduct standard microbiological research for developing new vaccines and therapies are many of those required to build and deploy a biological weapon. The potential biological threat spectrum is virtually endless. The wide, often confusing definition of what constitutes a biological weapon and who possesses the capabilities to deploy one has hampered the development of BWNP programs.



However, the two current components of BWNP—as well as current biodefense initiatives—do not adequately address the international BW threat. This threat can be characterized by a confluence of three critical factors in certain regions of the world, particularly South Asia, East Asia, and Southeast Asia. First, rapidly growing biotechnology industries have resulted in expanding reservoirs of materials, technologies, and expertise necessary to build and deploy biological weapons, also making biological weapons more accessible to more individuals and groups. Second, many recent outbreaks of highly infectious disease have occurred in those countries and regions where the biotechnology industry is growing most aggressively, resulting in expanding sources of material. And third, many subnational and transnational terrorist organizations are active in those same countries and regions.



It is necessary to clearly circumscribe the international BW problem in a way that makes it manageable. BWNP should aim to ensure the safe, secure, and responsible use of dangerous biological materials. The basis of such a "global biological materials management" approach to BWNP should be a prioritization of those agents, based on their biochemical properties, that are at the highest risk of being used maliciously. With such an agent-based security risk assessment, BWNP policies should primarily be based on the identification of those international facilities that possess collections of high security risk agents and the implementation of systems, policies, and procedures to ensure the safe, secure, and responsible use of those materials. These policies should be accompanied by the development and deployment of international surveillance systems designed to identify outbreaks of infectious disease associated with high security risk agents. Those outbreaks, in turn, should be controlled and managed to ensure adequate safety and security.

Source: Lauren Hickok 6928, MS 1371, 505-284-8828, fax 505-284-8870, lthicko@sandia.gov

Sandia Biosecurity Program Addresses Domestic Issues

The Sandia National Laboratories Biosecurity Program was founded in 1999 to advance US biological weapon nonproliferation and counterterrorism goals by protecting high-consequence pathogens and toxins and related critical security information against theft and sabotage. The Sandia Biosecurity Program provides analysis, assessment, and policy development to public and agricultural health agencies, both domestically and internationally.

The Biosecurity Program uses biological risk assessment and management methodologies to develop appropriate levels of security at biological research institutions. The program designs and implements security systems that address facility, personnel, information, materials, and transport security. This risk management process aims to achieve a critical balance between protection of dangerous pathogens and toxins and related security information and the preservation of an environment that promotes legitimate, life-saving biological research.

The Sandia biosecurity team developed USDA's biosecurity policies and procedures and has designed new biosecurity systems for USDA's Biosafety Level 3 laboratories. Sandia also wrote USDA's "Biosecurity Reference Standard" departmental manual, which is a comprehensive description of how to protect biological materials and research at USDA's bioscience laboratories. The Sandia biosecurity team developed the Centers for Disease Control and Prevention's select agent security plan, which has been implemented at the CDC's Select Agent laboratories, and has assisted the CDC with many other security related issues. Sandia has also assisted the Department of Health and Human Services develop hazmat transport security policies, information control policies, and classification guidelines.

Many of the DOE national laboratories and all of the NNSA national laboratories participated in a biosecurity risk and threat assessment exercise that Sandia hosted and facilitated. The work of this multilaboratory group focused on applying DOE/Sandia's Design and Evaluation Process Outline (DEPO) to existing and proposed Biosafety Level-2 and Biosafety Level-3 laboratories. The result of this effort was the creation of templates for biosecurity plans as well as critical data for the biological portion of DOE's chemical, biological, radiological, nuclear design basis threat and DOE's biosecurity policy.

Many bioscience research programs at universities have consulted Sandia on biosecurity issues and have implemented biosecurity policies and procedures based on Sandia's recommendations. Sandia has also served as the principal drafter of a biosecurity chapter for the fifth edition of *Biosafety in Microbiological and Biomedical Laboratories* for the CDC and the National Institutes of Health (NIH). Source: Reynolds M. Salerno 6928, MS 1374, 505-844-8971, fax 505-284-5055, rmsaler@sandia.gov

Biodefense *continued from page 5*

The similarly named project BioWatch monitors the air of major US cities to provide an early alert of a BW attack. Routine sampling is conducted to detect trace amounts of biological materials—materials that may have resulted from a bioterrorist attack. Because response time is critical, an early warning from BioWatch may allow first responders to be far more successful in mitigating the consequences of a biological attack.

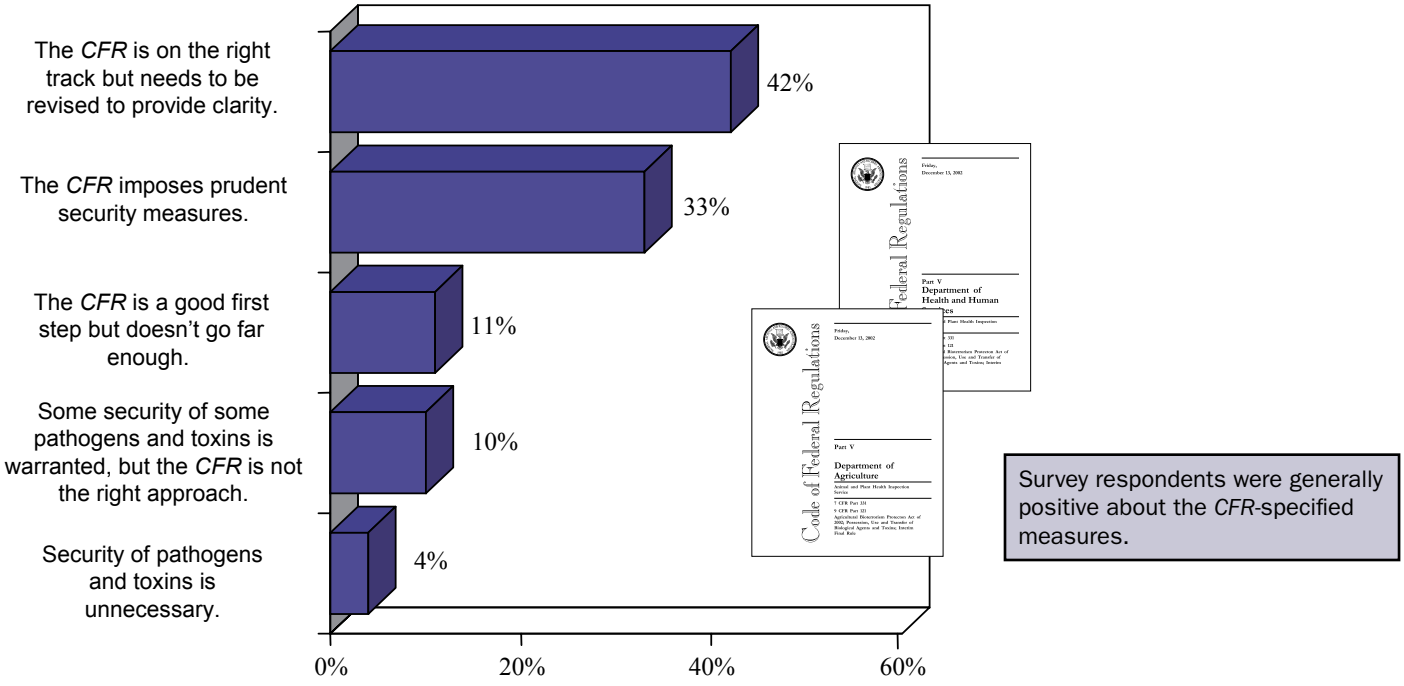
Considerable funding has been allocated to a number of other issues, including efforts to defend agriculture, water systems, and the food supply from biological attack. Funding for the Strategic National Stockpile has also increased and, since 2001, billions of dollars have been allocated to improve the ability of state and local health systems to respond to a biological attack or other major public health event.

Biodefense cannot by itself counter the threat posed by biological weapons. Today, and for the foreseeable future, significant gaps exist in diverse areas of the US biodefense infrastructure. These gaps include a lack of vaccines and therapies, inadequate sensor and detection capabilities, and weaknesses in overall public health response capability. These gaps demonstrate that US biodefense programs should be augmented with appropriate biological weapons nonproliferation programs. Source: Lauren Hickok 6928, MS 1371, 505-284-8828, fax 505-284-8870, lthicko@sandia.gov

Biosecurity in a Biosafety Environment

Laboratory biosafety and laboratory biosecurity are critical to the operation of a modern bioscience laboratory. These programs both aim to keep pathogens and toxins safely inside the laboratory. However, biosafety is designed to protect against accidental release while biosecurity is designed to protect against intentional removal. Sandia's biosecurity team worked with Reed Research Group to conduct an e-mail survey of the US bioscience community to learn about opinions and behaviors with regard to laboratory biosafety and biosecurity issues. Two-hundred-three responses were received, representing a range of institutions, including universities, industry, clinical laboratories, and government laboratories. Seventy-seven of the responding institutions work with Select Agents, for which the US government specifies biosecurity measures through various sections of the *Code of Federal Regulations*, specifically *47 CFR 73, 9 CFR 121*, and *7 CFR 331*.

According to 96 percent of the respondents, security of pathogens and toxins is needed. Somewhat counter to the expectations of Sandia's biosecurity team, 86 percent of the respondents were generally positive about the *CFR*-specified measures, as shown in the bar graph below. However, slightly more than half of those respondents indicated that the current regulations should be revised to provide clarity. The *CFR* measures have resulted in both positive and negative impacts, especially in the areas of funding and personnel. For instance, 30 percent said that they have received increased funding from their institutions to address security, while 35 percent say they need to use their own research funding for required security upgrades. One respondent commented, "In this day and age, biosecurity is a necessity. However, I fear that measures that are not easy to follow will discourage scientists with good intentions from working with these agents."



Most respondents (80 percent) believe that biosafety and biosecurity are compatible, while only 3 percent think that these two programs are incompatible. Although biosafety and biosecurity mitigate different risks, they share many common components. Good biosafety and biosecurity programs both include risk assessment and risk management, personnel management, material transport protocols, physical security elements, training, emergency planning, and program management. The survey explored several of these areas of overlap.

Access controls provide a good example of a tool that serves both security and safety functions. For security reasons, the *CFR* requires access controls to Select Agent laboratories and, not surprisingly, over 90 percent of Select Agent respondents reported that they control access to their laboratories. A sizable number of Select Agent facilities are using more sophisticated access controls, such as electronic controls (81 percent), guard identification (45 percent), and biometric controls (21 percent). However, over 75 percent of non-Select Agent respondents reported that they also control access to their laboratories. Voluntary access control may reflect a recognition that limiting laboratory access also serves a safety function.

In the absence of careful implementation, aspects of biosecurity may conflict with biosafety. Key areas that require special attention include emergency ingress and egress, badges, and signage. For example, OSHA (Occupational Safety and Health Administration) biohazard warning signs are typically located outside of laboratories (75 percent of Select Agent respondents); the signs are required to have the international biohazard symbol for Biosafety Level 2 organisms and higher in addition to listing precautions according to the latest information from the NIH, the CDC, and USDA. This signage often reveals the type of Select Agents in use (52 percent of Select Agent respondents). Although important safety reasons exist for identifying which dangerous biological materials are in which laboratories, this practice contradicts a fundamental tenet of security not to identify where specific dangerous assets are located.

A wide range of perceptions prevail on the current state of biosecurity. Some believe that "there has to be a tighter system of security," while others think that "the regulations are so inhibitory to research that they should be applied only to agents that would pose a significant threat." Obviously much work on biosecurity remains. Biosafety and biosecurity must be complementary systems that function as seamlessly as possible. It should be recognized that laboratory biosecurity relies first and foremost on a sound laboratory biosafety program. However, biosafety alone cannot provide sufficient biosecurity. To achieve biosecurity, new policies and procedures must be developed. In addition, several potential conflicts between biosafety and biosecurity must be resolved. Source: Jennifer Gaudioso 6928, MS 1371, 505-284-9489, fax 505-284-8870, jmgaudi@sandia.gov

Salerno Delegate to Geneva BWC Experts Meeting

Dr. Reynolds M. Salerno (Ren) of Sandia's Chem-Bio Nonproliferation Department was invited by the US Department of State to be one of three technical experts on the US Delegation for the Biological and Toxin Weapons Convention (BWC) Experts Meeting on biosecurity issues. The first week of the Experts Meeting, held in August 2003 in Geneva, Switzerland, focused on legal and punitive measures. The second week of the meeting addressed security and oversight of dangerous pathogens and toxins.

During the second week of the meeting, Ren presented the US government's perspective on biosecurity at facilities and in transport. Ren's presentations, titled "Security of Select Agents at Bioscience Facilities" and "Secure Transfer of Select Agents," focused attention on the specific steps that the United States is taking to address the protection of high consequence pathogens and toxins. Ren also emphasized that biosecurity is fundamentally a biological weapon nonproliferation initiative and thus is directly in line with the aims of the BWC.

Ren's participation was funded by the NNSA Nonproliferation Policy Division of the Office of Nonproliferation and International Security, which is pursuing various alternatives to strengthen the BWC. Source: Reynolds M. Salerno 6928, MS 1374, 505-844-8971, fax 505-284-5055, rmsaler@sandia.gov

BIOLOGICAL WEAPONS AND BIOTERRORISM TIMELINE

1346

Plague victims were catapulted over the city walls during the Tartar siege of Kaffa.

1746

The British Army distributed smallpox-infected blankets to Native Americans during the French and Indian War.

1925

The Geneva Protocol was signed, banning the use of BW in warfare.

1932 - 1945

Japan used BW against China and prisoners of war.

1942

The British tested weaponized anthrax on sheep on Gruinard Island, leaving the island under quarantine for 48 years.

1969

President Richard Nixon terminated the US offensive BW program.

1972

The Biological Weapons Convention (BWC) was signed. There are currently 163 signatories to the BWC.

1975

The US signed the Geneva Protocol.

1979

Anthrax was accidentally released from a BW production facility in Sverdlovsk, USSR.

1984

The Rajneeshees contaminated salad bars in Oregon with Salmonella bacteria.

1992

Russian President Boris Yeltsin reaffirmed Russia's commitment to the BWC after disclosing the existence of Biopreparat, a major clandestine BW program.

1990 - 1995

Aum Shinrikyo developed and attempted to disseminate botulinum toxin and anthrax.

1995

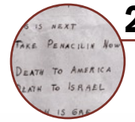
Larry Wayne Harris fraudulently obtained vials of plague from the American Type Culture Collection.

1998

The US started the anthrax vaccination program for US Armed Service personnel.

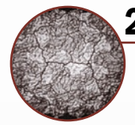
2001

An Australian experiment demonstrated increased virulence of mousepox virus via genetic engineering.



2001

Letters containing weaponized anthrax were sent through the US postal system.



2002

Polio virus was artificially synthesized in a US academic lab.

2004

Advances in biotechnology have created countless benefits but have introduced new proliferation threats.

Sandia Hosts 2004 Biosecurity Symposium

Participants in the August 2003 Experts Group Meeting of the Biological Weapons and Toxin Convention determined that additional discussions concerning pathogen and toxin security—biosecurity—would be beneficial to the international community. The NNSA Office of Nonproliferation Policy sponsored a six-day, follow-up symposium in February 2004, designed to share information and to clarify international perspectives on biosecurity. Sandia National Laboratories hosted the international event, and Ren Salerno, program manager of the Biosecurity program at Sandia, and his Biosecurity team welcomed over 60 bioscience and policy experts from 14 countries.

The International Symposium on Securing High Consequence Pathogens and Toxins constituted an opportunity for a wide variety of nations to begin an international dialogue focused on biosecurity. The symposium had three broad goals: 1) to set biosecurity in the context of biological weapons nonproliferation and biodefense, 2) to elicit from the international participants their interpretations and concerns about biosecurity, and 3) to present the United States' experiences in implementing biosecurity. The symposium was a promising beginning to further international collaboration on biosecurity.

Throughout the symposium, audience participation was strongly encouraged. Discussion sessions were organized each day, and the final day was devoted to a roundtable discussion. Many issues were raised that require future consideration. Attendees expressed legitimate fears that biosecurity could be a hindrance to infectious disease research, fears that must be addressed and alleviated by ensuring that biosecurity practices are commensurate with the bioterror threat and do not impede necessary laboratory work.

Discussions also revealed the need for subsequent regional workshops on biosecurity and a desire for additional work toward developing international biosecurity guidelines. The World Health Organization was chosen as the appropriate organization to draft and distribute biosecurity guidelines, but the question remains of how the international community can best support this process. Many participants expressed the opinion that regional workshops should be conducted to help clarify and promulgate the new recommendations for the benefit of nations interested in instituting biosecurity. Source: Reynolds M. Salerno 6928, MS 1374, 505-844-8971, fax 505-284-5055, rmsaler@sandia.gov

Thailand Hosts Biosecurity Workshop

Sandians Ren Salerno and Natalie Barnett participated in the National Workshop on Biosecurity in Bangkok, Thailand, on September 27 and 28, 2004. The workshop was jointly sponsored by Thailand's National Center for Genetic Engineering and Biotechnology (BIOTEC) and Sandia National Laboratories. In mid-2004, the Ministry of Science and Technology, and specifically BIOTEC, was given responsibility for Thailand's adherence to the Biological and Toxin Weapons Convention. Ms. Chalinee Kongsawat is the focal point for BWC-related issues at BIOTEC, and her attendance at the international biosecurity symposium hosted by Sandia in February 2004 resulted in the invitation for Sandia to conduct a workshop in Thailand with BIOTEC.

Ren acquainted the audience with Sandia National Laboratories, discussed the relationship between securing dangerous pathogens and toxins (biosecurity) and the BWC, and provided the audience with an overview of how the United States approaches biosecurity. He also addressed the prospects for an international approach to biosecurity. Natalie presented the biosecurity team's methodological approach to biosecurity, covering the topics of physical security, personnel management, material control and accountability, transfer security, information security, and program management. Following these presentations, Dr. Banpot Napompeth, Chairman of Thailand's Ad Hoc Working Group on the Biological Weapons Convention, moderated a discussion about the implementation of biosecurity in Thailand. Sandia has invited Thailand to nominate someone to become a Sandia Visiting Scholar on biosecurity in 2005. Source: Natalie Barnett 6928, MS 1371, 505-284-6615, fax 284-8870, nbarnet@sandia.gov

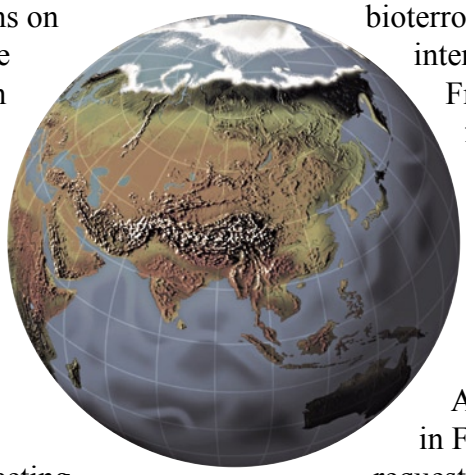
Acronyms

ADE	Preparedness for Accidental and Deliberate Infections (WHO program)
BioRAM	Biological Risk Assessment Methodology (computer model and methodology)
BIOTEC	National Center for Genetic Engineering and Biotechnology (Thailand)
BW	biological weapon(s)
BWC	Biological and Toxin Weapons Convention
BWNP	biological weapons nonproliferation
BWPPP	Biological Weapons Proliferation Prevention Program (CTR)
CBACI	Chemical and Biological Arms Control Institute
CDC	Centers for Disease Control and Prevention (US)
CFR	Code of Federal Regulations (US)
CMC	Cooperative Monitoring Center (SNL)
CTR	Cooperative Threat Reduction
DOE	Department of Energy (US)
DOS	Department of State (US)
EDD	Entomologic Surveillance to Aid Early Disease Detection (LDRD project)
FMD	foot and mouth disease
FSU	former Soviet Union
HEU	highly enriched uranium
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IISS	International Institute for Strategic Studies
INTERPOL	International Criminal Police Organization
ISP	International Security Programs (SNL)
LANL	Los Alamos National Laboratory
LDRD	Laboratory Directed Research and Development (SNL)
LLNL	Lawrence Livermore National Laboratory
NA-243	International Safeguards Division (NNSA)
NIH	National Institutes of Health (US)
NNSA	National Nuclear Security Administration (DOE)
OSHA	Occupational Safety and Health Administration (US)
RF	Russian Federation
ROK	Republic of Korea (South Korea)
Rosatom	Federal Atomic Energy Agency (Russia)
RSVP	Rapid Syndrome Validation Project
SARS	severe acute respiratory syndrome
SNL	Sandia National Laboratories
UEIP	Ural Electrochemical Integrated Plant (Russia)
UK	United Kingdom
USDA	United States Department of Agriculture
VNIIA	All-Russian Scientific Research Institute of Automatics
VNIIEF	All-Russian Scientific Research Institute of Experimental Physics
VNIITF	All-Russian Scientific Research Institute of Technical Physics
WHO	World Health Organization
WMD	weapons of mass destruction

Sandia Pursues International Biological Weapons Nonproliferation

FOCUS

At least five hundred culture collections around the world stock dangerous pathogens. Many US experts are developing strategies aimed at consolidating many of these collections into fewer, more secure facilities. The former Soviet Union is receiving a lot of attention because of its former bioweapons program. The US Cooperative Threat Reduction (CTR) program works to secure facilities in the FSU, engage scientists in legitimate bioscience work, and enhance disease reporting systems. Members of the Sandia biosecurity team have traveled to the former Soviet republics to give presentations on biosecurity. In October 2000, before the anthrax attacks focused attention on bioterrorism, Sandia hosted a biosecurity workshop for the directors and deputy directors of laboratories in the former Soviet republics, including Russia, that had been affiliated with the Soviet Union's offensive biological weapons program.



At the 2003 BWC Experts group meeting in Geneva, the concept of biosecurity raised considerable interest and confusion. For this reason, the US Departments of State and Energy asked Sandia to conduct an in-depth international symposium on biosecurity in fiscal year 2004. Sandia hosted this large international event in February 2004. The event focused on approaches to securing high consequence pathogens and toxins located in bioscience facilities worldwide from possible theft and sabotage. The symposium addressed the need to balance security with microbiological research and identified areas for international cooperation (See "Sandia Hosts 2004 Bisecurity Symposium," page 12).

A variety of nongovernmental organizations are also involved in countering the threat of biological weapons and bioterrorism. The International Institute for Strategic Studies (IISS) and the Chemical and Biological Arms Control Institute (CBACI) are jointly sponsoring the creation of an international center for the life sciences, which would help establish norms for scientists and technicians who work with dangerous organisms and have access to information and technologies that could be misused. IISS and CBACI held three international meetings on this topic between April and December 2004. Various groups, such as the Federation of American Scientists, are preparing course materials for biosecurity students. The International Criminal Police Organization (INTERPOL) has launched an international training program for police on biosecurity and fighting bioterrorism; INTERPOL's first major international meeting takes place in Lyon, France, in February 2005. The Center for Biosecurity at the University of Pittsburgh Medical Center is conducting an "International Conference on Biosafety and Biorisks" in Lyon, France, in March 2005.

At the Sandia biosecurity symposium in February 2004, many participants requested that Sandia conduct regional biosecurity workshops to further explain the political and technical nature of laboratory biosecurity. In September 2004, Sandia conducted a national workshop in Bangkok, Thailand (See "Thailand Hosts Biosecurity Workshop," page 13). Sandia will conduct a national workshop in Kuala Lumpur, Malaysia, in March 2005. In addition Sandia plans visits to the Philippines, Indonesia, Singapore, and India in early 2005.

Following the Sandia biosecurity symposium in February 2004, the World Health Organization requested that Sandia draft the WHO's international biosecurity guidelines for facilities that handle, use, or store dangerous pathogens and toxins. In September 2004, Sandia sought assistance in developing these WHO guidelines from the United Kingdom, Japan, and Singapore. The WHO plans to have these international biosecurity guidelines completed by February 2005.

Source: Reynolds M. Salerno 6928, MS 1374, 505-844-8971, fax 505-284-5055, rmsaler@sandia.gov

RSVP Supports Biological Weapons Nonproliferation

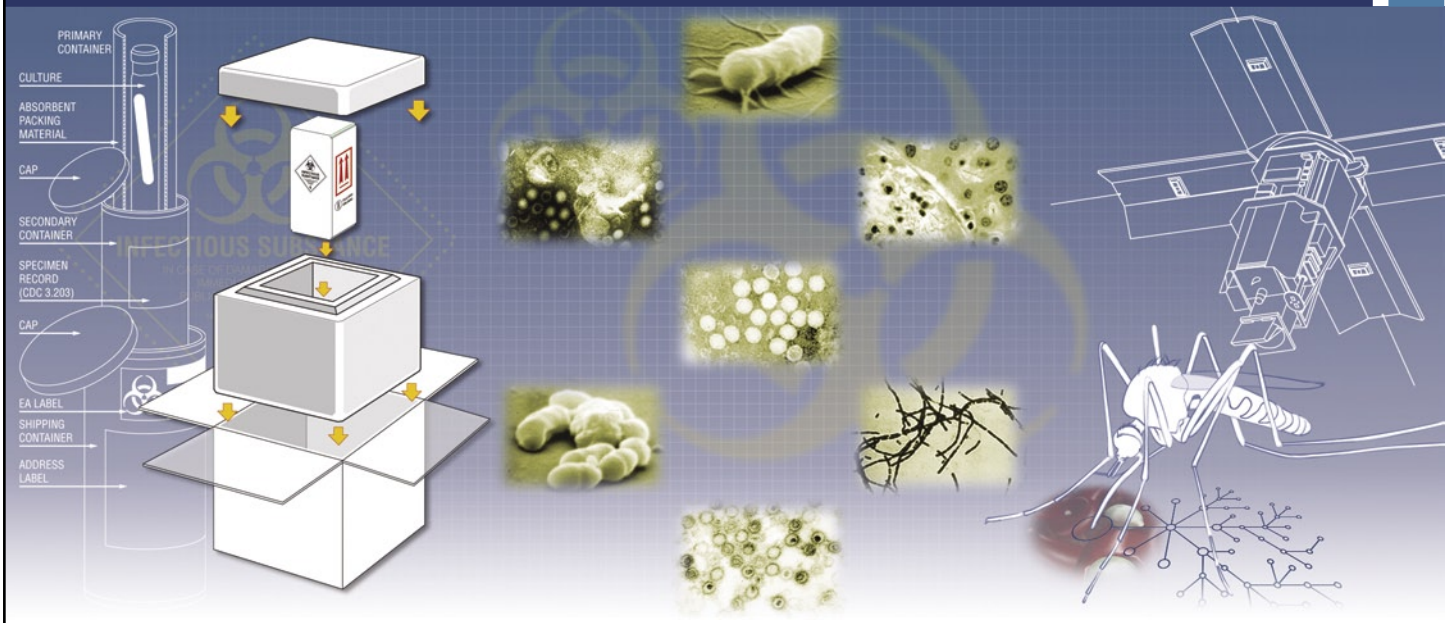
Infectious diseases, in both humans and animals, continue to be the leading cause of death and economic loss throughout the world. As people travel more and more, infectious diseases within the human population are spreading at an ever increasing rate. In addition, increased importation of animals and expanding migratory pathways have caused zoonotic and other animal diseases to spread among wider populations.

A simple reporting system located in various human and animal health facilities, such as hospitals and veterinary clinics, would accelerate the identification and treatment of infectious disease. Sandia's Rapid Syndrome Validation Project (RSVP) was designed with this goal in mind. In contrast to a diagnosis-based reporting system, RSVP collects data for both human and animal diseases based on syndromes—the signs and symptoms recognized by the clinician. Ideally, RSVP will contribute to an information network that can quickly identify the emergence of unusual disease.

RSVP works by providing a communications network between the health practitioners and the epidemiologists within the community, transmitting the information to provide clustering of syndromes and correlation among syndromes. In addition, most countries are concerned with the potential political ramifications of sharing detailed disease outbreak information regarding their human and animal populations. However, by working at the syndrome level and by keeping the details of each entry to a minimum, RSVP has been accepted in many countries, including the United States, to monitor the human and animal populations.

RSVP supports the BWC requirement for technical cooperation on the identification and mitigation of infectious diseases. RSVP monitors the general health of the human and animal populations and creates a data exchange at national and international levels. In addition to tracking endemic diseases, RSVP can also be used to track emerging or unusual outbreaks. Nonendemic outbreaks can occur naturally or they can be caused by bioterrorism or an accidental release during the test and development of biological weapons. An RSVP-like system in continuous use would help the international community more quickly identify the outbreaks of unusual disease that could be the result of malicious use. Source: Susan Caskey 6928, MS 1371, 505-284-5095, fax 505-284-5055, sacaske@sandia.gov

Sandia LDRD Augments Biological Weapons Nonproliferation



FOCUS

Sandia National Laboratories' value as a national resource is its world-class science, technology, and engineering capabilities. With the concurrence of the Department of Energy, Sandia's Laboratory Directed Research and Development (LDRD) program provides the flexibility to invest in long-term, high-risk, and potentially high-payoff research activities that stretch Sandia's science and technology capabilities. LDRD supports Sandia's four primary strategic objectives: nuclear weapons, nonproliferation and materials control, energy and critical infrastructure, and emerging national security threats. To meet these objectives, LDRD promotes creative and innovative research and development by funding initiatives that are discretionary, short-term, and often high-risk and that attract exceptional research talent across disciplines. Three biological weapons nonproliferation projects are underway with LDRD funding: Fail-Safe Infectious Substance Transport Packages, Biological Risk Assessment Methodology (BioRAM), and Development of Entomologic Surveillance to Aid Early Disease Detection (EDD).

The objective of the Fail-Safe Infectious Substance Transport Packages project is to develop a self-remediating packaging method for the transport of infectious substances. Outbreaks of infectious disease, whether natural or intentional (bioterrorism), can significantly impact international security and regional stability. The international response to outbreaks requires transport of infectious substances. Safe and secure transport of infectious substances is needed to identify samples, to provide evidence for attribution, and to support decisions on international cooperation to address and contain an outbreak. Sandia will attempt to enhance the existing triple packing system by developing a replacement for the absorbent material currently required for the infectious substance triple packing method. The efficacy of the neutralizing/adsorbent material against infectious material containing vegetative bacteria, viruses, and bacterial spores will then be tested. Researchers will also identify a method for pressure relief inside the secondary container to accommodate any gases that are released as a result of degradation of the neutralizing material by the infectious substance. This fail-safe packaging technology will significantly enhance the ability to transport infectious substances, minimizing the response time.

The BioRAM project seeks to limit the spread of biological weapons through the protection of dangerous pathogens and toxins—the basic building blocks of a biological weapon—against theft or sabotage. The BioRAM project proposes to develop a biological risk assessment computer model and methodology that consider the unique challenges associated with protecting dangerous pathogens.

***LDRD** continued on page 17*

HEU Transparency Program Celebrates Tenth Anniversary

The Ural Electrochemical Integrated Plant (UEIP), the world's largest uranium enrichment enterprise and manufacturer of advanced process control technology for the nuclear industry, hosted an anniversary celebration for the Highly Enriched Uranium (HEU) Transparency Program. US monitors, UEIP officials, representatives from the DOE Embassy Moscow Office, the Russian Federal Atomic Energy Agency (Rosatom), and the US Consul General at Yekaterinburg gathered at the newly remodeled Rope Corner Resort in Novouralsk on August 20, 2004, to mark the tenth-year anniversary of the signing of the HEU Transparency Program Protocol. The eighth anniversary of the US Transparency Monitoring Office (TMO) and the fifth anniversary of the operation of a US Blend Down Monitoring System at the UEIP facility were also celebrated. US monitors at the celebration had just completed the radioactive source change-out in the Blend Down Monitoring System.

The celebration began with boat tours of the lake that borders the closed city of Novouralsk. Local press came to hear Anatoly Petrovich Knutarev (UEIP Director), Scott Rauland (US Consul General), Edward Mastal (HEU Transparency Implementation Program Manager), and Vladamir Vasilievich Evseenko (Rosatom representative) explain the history of the mutual cooperation and long-term successes of the HEU Transparency Implementation Program. Mr. Knutarev and Mr. Mastal exchanged commemorative gifts, including certificates marking the ten years of HEU Transparency Monitoring and eight years since the opening of the Transparency Monitoring Office. During the banquet, an HEU anthem written by a UEIP program manager was sung in Russian and in English. The anthem will be shared with the other three Russian facilities (Siberian Chemical Enterprise, Mayak Production Association, and the Electrochemical Plant) that are involved with the HEU Program. Source: Dennis Nelson 6926, MS 1371, 284-3727, fax 284-8870, danelso@sandia.gov

***LDRD** continued from page 16*

New US regulations and emerging international guidelines demonstrate the need for a rigorous and defensible approach to evaluating the security risk of biological agents and facilities. Current lists of dangerous agents consider their public health consequences but neglect the agent's weaponization potential. Researchers will perform a technical analysis of candidate BW agents, evaluating weaponization potential and consequences of use and developing an algorithm for the evaluation of security risk at biological facilities.

The EDD project seeks to reduce the threat of an insect-vector bioweapon or an emerging disease through entomological surveillance. To provide an early indicator of a vector-borne highly infectious disease, researchers must collect and analyze insects quickly. Current methods of tracking and analyzing insects are very slow and labor intensive. In addition, most insect information is not shared internationally. To enable the rapid collection of insects, the public health community needs a better method of determining where the insects are located. In addition, information about the density of the insect population, new insects within an area, and the diseases these insects may carry needs to be shared with other countries within the region. The EDD project will undertake prediction of insect location with the use of remote sensing and geographic information systems. EDD will analyze satellite imagery that, when tied to weather patterns, soil content, elevation, and swarm tracking, may lead to the ability to track insects for collection, both within a country and along its borders. Although individual insects will be too small for satellite detection, swarms can possibly be detected, as well as insect indicators such as vegetation damage or ideal habitats. Source: Reynolds M. Salerno 6928, MS 1374, 505-844-8971, fax 505-284-5055, rmsaler@sandia.gov

Sandian Investigates Middle East Water Needs

Dr. Phil Pohl of Sandia's Geoscience and Environment Center recently spent four weeks in the Middle East pursuing activities that would involve Sandia National Laboratories technology. The primary purpose of Phil's trip was to participate in the USDA's Foreign Agriculture Service US/Egypt Young Scientist Exchange project. Phil also traveled to Amman, Jordan, where he visited with numerous research groups whose missions align well with Sandia's Water Initiative. Finally, Phil represented Sandia in the Libyan Worker Redirection workshop hosted by the US Department of State.

Phil was hosted in Egypt by the Central Laboratory for Agriculture Climate at Ain Shams University. Working mostly with graduate and postgraduate students in the soilless culture lab, he built two hydroponic forage producing structures and demonstrated the technology. Phil also met with management and staff from the Ministry of Agriculture's two main centers, the Agriculture Research Center and the Desert Research Center. Phil visited the Desert Research Center's headquarters in Cairo and the North Sinai Extension Station, where he set up a demonstration of hydroponic forage production. The Executive Director of the Regional Information Technology and Software Engineering Center (http://www.ritsec.org.eg/), a modern business consortium for future information technology transfer, agreed to spearhead a proposal to USAID (US Agency for International Development) for approximately $1 million to demonstrate a sustainable development project.

In Amman, Phil presented a seminar at Jordan's Royal Scientific Society. The seminar and visit were set up by Ahmad Alabed of the Royal Scientific Society and Iyad AlDasouqui of the Cooperative Monitoring Center (CMC) in Amman, who had met Phil while they were visiting scholars at Sandia's CMC. Phil toured the CMC-Amman, including display areas demonstrating environmental monitoring, border detection, RSVP (Rapid Syndrome Validation Project), and remote sensing. Phil also met with Dr. Saad AlAyyash of Water Resources Engineering and Mohammad Shahbaz, Programme Director of the Higher Council for Science and Technology's Jordan Badia Research and Development Programme, both of whom Phil had previously met in Denver as part of an International Study Team on the Middle Eastern Regional Cooperation Project relating to watershed management.

While visiting Amman, Phil also met with Abdel Nabi Fardous, soil and irrigation director general at the National Center for Agriculture Research and Technology Transfer. The director is also the

President of the Association of Agricultural Research Institutions in the Near East and North Africa, a key organization in the water-agriculture nexus in the region. At the Amman Center for Peace and Development, Phil met with Issaaf Howandeh, projects coordinator. This small, nonprofit organization has a vision that is well aligned with Sandia's in creating regional stability. Finally, Phil met with Wesley Lane, Weston Solutions project manager for Iraq reconstruction. During Mr. Lane's four-month tenure with Weston Solutions, he has expanded the construction activity from $150 million to $175 million and sees $200 million as a reachable target in the near term.

The first two of a series of four Weapons of Mass Destruction (WMD) Scientist Redirection Workshops sponsored by the United Kingdom (UK), US, and Libyan governments were held while Phil was in Libya. The workshops were planned to provide an initial basis for meeting scientists and engineers associated with Libya's former WMD efforts in order to develop avenues for technical interactions, training, exchanges, and cooperative research agreements that will offer the Libyan experts new research topics in civilian areas and will help eliminate the threat of future weapons proliferation. These first two workshops covered topics in (1) Water Management and Desalination and (2) Nuclear Medicine and Radiotherapy. The remaining two workshops will cover (3) Environmental Monitoring of Toxic Substances and (4) Petroleum Industry Technology Development.

In addition to Phil and three Lawrence Livermore National Laboratory (LLNL) scientists, participants in the first two workshops included representatives of the US Departments of State and Energy; four representatives from the UK; and approximately 20 to 25 Libyan scientists associated with the Tajura Research Facility, the National Board of Research and Development, the General Water Authority, the Petroleum Research Centre, and Tripoli Medical Centre. The workshops included a number of overview presentations from the participants; a series of local site visits to the West Tripoli Power Station, the Tajura Renewable Energies and Water Desalination Center, and the Tripoli Medical Centre; and interactive project development discussions among Libyan, UK, and US scientists.

Several prototype quick-start proposals for cooperative work between the Libyan scientists and their UK and US counterparts were outlined, including development of a geohydrological/chemical database for the Tripoli-area groundwater basin; development and application of improved water purification technologies; and assessment of skills, resources, and market for commercial isotope production. Funding for Libyan participants is expected to be available through the US State Department and/or the UK government. The projects are intended to stimulate economic development in Libya and to better integrate and redirect their WMD scientists into the worldwide scientific community. The Libyans were also enthusiastic about a sister-laboratory arrangement with LLNL and identified several areas for collaboration, including research reactor management, repair, and maintenance; environment, safety, and health training; vocational training; and neutron activation analysis.

The Libyans took a genuine and strong interest in the interactions and were supportive, helpful, and pleased with the outcome. Next steps will focus on developing more detailed proposals for cooperative projects that can deliver tangible results in the near term, organizing the remaining workshops, and finalizing a sister laboratory agreement involving DOE, LLNL, and Tajura. In early 2005, participants hope to organize a US study tour that would demonstrate the economic diversification at former US weapons sites and national laboratories. Source: Phil Pohl 6143, MS 0720, 505-844-2992, fax 505-844-2348, pipohl@sandia.gov

Calendar: Visits, Workshops, and Conferences

February 22-23 **Albuquerque, New Mexico:** Sandia hosts the DOE-ROK Permanent Coordinating Group at the International Programs Building for the group's eighth annual meeting. (NA-243) Donnie Glidewell 6923, 505-844-9261

March 14-18 **Albuquerque, New Mexico:** Sandia hosts *US-China Workshop on Nonproliferation and Confidence Building Measures* at the International Programs Building. (NA-243) Karl Horak 6926, 505-844-8821

April 4-6 **Chantilly, Virginia:** Sandia hosts international experts from the nuclear energy and nonproliferation communities for the Fourteenth Annual International Security Conference *Strengthening the Nuclear Nonproliferation Regime: Focus on the Civilian Nuclear Fuel Cycle.* (Sandia National Laboratories) Arian Pregenzer 6920, 505-844-4967, www.intlsecconf.sandia.gov

April 18-22 **Snezhinsk, Russia:** VNIITF hosts SNL, LANL, LLNL, VNIIA, and VNIIEF for the inaugural meeting of the steering committee for the US-RF Strategic Partnership for Enhancing Responses to Future Nuclear Nonproliferation Challenges. The six-lab partnership intends to address technical nonproliferation issues related to world-wide use of nuclear energy and its implications in terms of managing the spread of nuclear materials and nuclear technology. (NA-24) Bob Huelskamp 6926, 505-844-0496

July 10-14 **Phoenix, Arizona:** Institute of Nuclear Materials Management 46th Annual Meeting to be held at the JW Marriott Desert Ridge. John Matter 6923, 505-845-8103, www.inmm.org

October 11-14 **Las Palmas de Gran Canaria, Spain:** 2005 IEEE International Carnahan Conference on Security Technology (39th Annual Conference) to be held at the Hotel Santa Catalina. Daniel Pritchard 4128, 505-844-5569, www.carnahan2005.ulpgc.es

International Security News is on the Web
http://www.cmc.sandia.gov/newsletter.htm

International Security News is on the SNL Internal Restricted Network
http://www.csu836.sandia.gov/organization/div6000/ctr6900/newslet/newslet.htm

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